

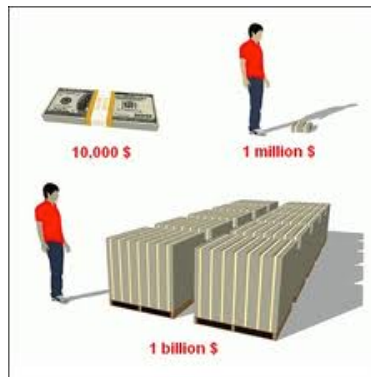
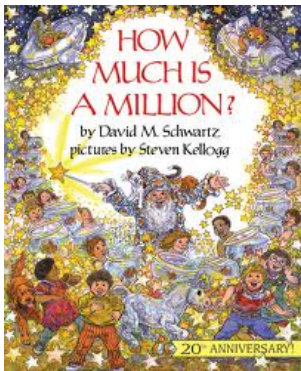
Chapter 9 Exponents & Scientific Notation

9.1 Exponents

Unit Question: What is the power of powers?

Learner Profile: Reflective

Area of Interaction: Community & Service



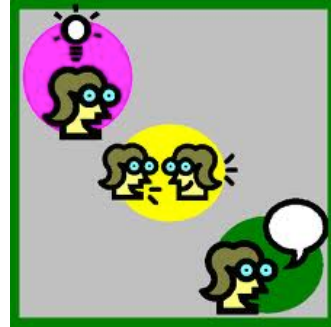
I Can Statement:
I can use exponents to
write numbers.



Think, Pair, Share

What is an exponent?

Why do we use exponents?



Journal page 175

1 ACTIVITY: Using Exponent Notation

Work with a partner.

- a. Copy and complete the table.

Power	Repeated Multiplication Form	Value
$(-3)^1$	-3	-3
$(-3)^2$	$(-3) \cdot (-3)$	9
$(-3)^3$	$(-3)(-3)(-3)$	-27
$(-3)^4$		
$(-3)^5$		
$(-3)^6$		
$(-3)^7$		

$$\begin{aligned}
 -3^3 &= -1(3)(3)(3) \\
 &= -27 \\
 (-2)^2 &= (-2)(-2) = 4 \\
 -2^2 &= -1(2)(2) = -4
 \end{aligned}$$

- b. Describe what is meant by the expression $(-3)^n$. How can you find the value of $(-3)^n$?

A **power** is a product of repeated factors. The **base** of a power is the common factor. The **exponent** of a power indicates the number of times the base is used as a factor.

base

exponent

$$\left(\frac{1}{2}\right)^5 = \underbrace{\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}}_{\text{power } \frac{1}{2} \text{ is used as a factor 5 times.}}$$

Writing Expressions Using Exponents

Write each product using exponents

a. $(4)(4)(4)$ $(4)^3$

b. $(-3)(-3)(-3)(-3)(-3)$ $(-3)^5$

[illegible]

Writing Expressions Using Exponents

Write each product using exponents

a. $(x)(x)(x)$ $(x)^3$

b. $(y)(y)(y)(x)(x)$ $(y)^3(x)^2 = y^3x^2$

c. $(2)(2)(y)(y)(z)(z)(z)$ $2^2y^2z^3$

Evaluating Expressions

Evaluate the expression.

a. $(-2)^3 = (-2)(-2)(-2) = -8$

b. $4^2 = 16$

c. $-3^4 = -1(3)(3)(3)(3) = -81$

d. $(-5)^1 = -5$

e. $(-6)^2 = (-6)(-6) = 36$

$$\begin{aligned} 10^0 &= 1 \\ 10^3 &= 10 \cdot 10 \cdot 10 \\ 10^2 &= 10 \cdot 10 \\ 10^1 &= 10 \\ 10^0 &= 1 \end{aligned}$$

I Can Statement:

I can use exponents to write numbers.



Using Order of Operations

Evaluate the expression.

a. $3 + 2(3)^4 =$

Handwritten solution: $3 + 2(81) = 3 + 162 = 165$

b. $3^3 - 8^2 \div 2 =$

Handwritten solution: $27 - 64 \div 2 = 27 - 32 = -5$

c. $(-5)^1 + (-6)^2 =$

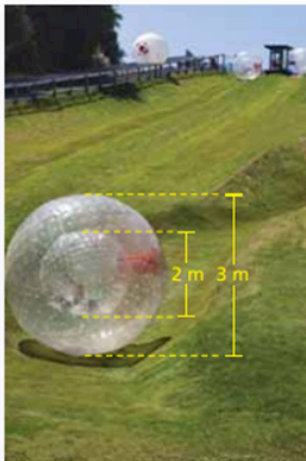
Handwritten solution: $-5 + 36 = 31$

d. $-3^3 \div 27 =$

Handwritten solution: $-27 \div 27 = -1$

e. $|-3^3 \div 27| =$

Handwritten solution: $|-27 \div 27| = 1$

EXAMPLE 4 Real-Life Application

In sphering, a person is secured inside a small, hollow sphere that is surrounded by a larger sphere. The space between the spheres is inflated with air. What is the volume of the inflated space?

(The volume V of a sphere is $V = \frac{4}{3}\pi r^3$. Use 3.14 for π .)

Outer sphere

$$V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi (1.5)^3$$

$$= \frac{4}{3}\pi (3.375)$$

$$\approx 14.13$$

Write formula.

Substitute.

Evaluate the power.

Multiply.

Inner sphere

$$V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi (1)^3$$

$$= \frac{4}{3}\pi (1)$$

$$\approx 4.19$$

So, the volume of the inflated space is about $14.13 - 4.19$, or 9.94 cubic meters.

Challenge: Journal page 177

4 ACTIVITY: Writing a Power

Work with a partner. Write the number of kits, cats, sacks, and wives as a power.

*As I was going to St. Ives
I met a man with seven wives
And every wife had seven sacks
And every sack had seven cats
And every cat had seven kits
Kits, cats, sacks, wives
How many were going to St. Ives?*

Nursery Rhyme, 1730



Assignment:

Workbook p. 175, 177

Textbook p.354-355
2-16 even, 17-20all, 22-26even, 27-28

